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EXAMINER	
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ART UNIT	**PAPER NUMBER**
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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No. 08/889,440	Applicant(s) Takeuchi et al.
	Examiner Hugh Jones	Group Art Unit 2763

☒ Responsive to communication(s) filed on *Jul 8, 1997*.

☐ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire *3* month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) *1-32* is/are pending in the application.

Of the above, claim(s) ______ is/are withdrawn from consideration.

☐ Claim(s) ______ is/are allowed.

☒ Claim(s) *1-32* is/are rejected.

☐ Claim(s) ______ is/are objected to.

☐ Claims ______ are subject to restriction or election requirement.

Application Papers

☒ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on ______ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on ______ is ☐approved ☐disapproved.

☒ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☒ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☒ received.

☐ received in Application No. (Series Code/Serial Number) ______.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: ______.

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). *1*

☐ Interview Summary, PTO-413

☒ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foriegn priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 08/889,440, filed on 07/08/97.

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

3. The disclosure is objected to because of the following informalities: The word “collided” (page 10, line 15) should be replaced with “colliding”, “S211" (page 19, line 13) should be replaced with “S221”, “generation” (page 27, line 3) should be replaced with “ generated”, “componet” (fig. 3, #730) should be replaced with “component”, “Maxwel” (fig. 9, #780) should be replaced with “Maxwell”, “columns 86, 87, 88" (page 18, line 25) should be replaced by “rows 86, 87, 88" (The use of column or columns instead of row or rows appears to occur throughout the disclosure, please check for all occurances). Appropriate correction is required.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 20-22 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The applicant is attempting to claim an algorithm, specifically a simulation algorithm. Inclusion of the phrase "a computer implemented method" would aid in overcoming this rejection.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 20-22 are also rejected under 35 U.S.C. 112, first paragraph. Specifically, since the claimed invention is not supported by either a asserted utility or a well established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention.

8. Claims 6, 8, 9, 27, 29, and 31 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

9. As per claims 6, 8, and 29, wherein "...indicating whether the smaller particles of a respective individual particle are fixed against center of mass of the individual particle...", it is not clear what the individual particles and smaller particles are. Under one assumption, the individual particle is a cluster or some similar entity of adsorbate particles and the smaller particles are individual adsorbate particles (the cohesive forces would have to be greater than the kinetic energies of the individual particles [and which I assume are significant since they are being "generated" and must have enough momentum to reach the substrate]). No mention has been made concerning clusters in the specification. On the other hand, if the individual particle is on molecule or ion, then the smaller particles refer to electrons, etc. Of course in the case of electrons, they are not fixed with respect to the center of mass of the larger particle.

10. As per claim 27, wherein "...each substrate particle includes a fixed particle, a temperature control particle and a **free particle**...", it is not clear how a substrate particle can include a free particle since by definition a substrate particle is tied to a lattice.

11. As per claims 9 and 31, wherein "...when generating an individual particle, the particle motion computing unit provides a random direction of center of mass velocity of the individual particle...", in light of the specification, the examiner assumes that the direction is random within a cone (where the vertex of the cone is centered at the generator and the cone is pointed towards the substrate). The issue is that the examiner assumes that the applicant does not want the particles to have a direction of velocity directed away from the substrate.

12. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

13. Claims 1-3, 5-6, 8-10, 12, 15-18, 20-23, and 29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. A number of claims were found to be indefinite because they contained terms which were unclear in their meaning.

14. As per claims 1-3, 5-6, 8-10, 12, 15-18, and 20-23, it is not clear what the terms "combined particle" and "individual particle(s)" means with respect to the following. This is evident from examination of claims 1 and 2. In claim 1, the following is stated, "...a combined particle formed of individual particles..."; however, in claim 2, the following is stated, "wherein the combined particle is formed of substrate particles and adsorbate particles, each said individual particle being an adsorbate particle." Is a combined particle formed of individual particles, where by definition, the individual particles are adsorbate particles, or is the combined particle is formed of substrate particles and adsorbate particles. It is also unclear what is meant by "combined particle."

15. As per claim 29, wherein, "...each adsorbate particle includes a plurality of smaller particles...", it is not clear what this means. Is it an absorbate particle in the sense of the "combined particle" and the smaller particles are individual absorbate particles, or is it an individual absorbate particle wherein the smaller particles are the electrons, ions, etc.?

16. The following clarifications are requested in order to facilitate the examiner's understanding of the applicant's invention. As per claims 1-3, 5, 10, 12, 16-17, 20-24, and 32, it is

not clear what the term "combined particle" means with respect to the following. First, with respect to a combined particle formed of only adsorbate particles, does this mean that the individual particles in the combined particle are interacting with each other (through, for example, van der Waals forces and thus the combination represents an underlying physical process) or is this just a fictitious representation which aids in reducing the complexity of the problem? Second, with respect to a combined particle formed of adsorbate particles and substrate particles, what is meant by this combination. Is it a combination in the sense of, for example, a polaron (again a physical criterion) or again a fictitious representation?

17. As per claims 10, 12, 22, and 32, the use of "corresponding" is unclear. For example, in claim 10, the phrase "...each individual particle has a corresponding emission source..." is used. Does this mean that if there are 50 particles generated, that there are 50 emission sources, or that the 50 particles have the same emission source?

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

19. Claims 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Misaka et al. in view of Baumann et al.. As noted above there are some issues concerning the applicant's

definitions of terms such as individual particle, combined particle, smaller particle, etc. The examiner has examined the merits of the claims based on the the most reasonable interpretation of those terms. Clarification of the above mentioned issues would aid the examiner in judging the merits of the claims.

20. In general, the applicants are disclosing method and apparatus to simulate physical interaction of (in the more narrow claims) adsorbates and a substrate. There is an abundance of publications concerning this topic; representative publications (which are not cited in the prior art rejection) are provided at the end of this office action. The applicant has emphasized the concept "combined" throughout the claims; if there is special significance to this term (such as a new interpretation pertaining to the underlying physical interactions between particles), it is not supported by the specification. Again, clarification of the above mentioned issues would aid the examiner in judging the merits of the claims. The prior art rejections will be based on the examiner's interpretation of the specification and claims.

21. Misaka et al. disclose a dry-etching process simulator wherein a surface reaction model is used to simulate topological evolutions by taking into account the existence of adsorbed radicals on the substrate surface. Misaka et al. apparently do not mention "combined particles". Baumann et al. disclose 3D modeling of sputtering using a *mesoscopic* hard-sphere Monte Carlo model. This work is included because Baumann et al. go further than Misaka et al. as pertains to "combined particles" (see fig. 1 of Baumann et al.). Baumann et al. simulate the behavior of clusters as they interact with a substrate (note that the use of ion cluster beams and molecular

beams for deposition and/or sputtering are well known techniques; this phenomena has also been simulated.). Not all details of the applicant's disclosure are present in these two inventions; however, both could easily be used to obtain results concerning the physical phenomena which the applicant is interested in. Both sets of inventors are concerned with the simulating the dynamics of particles which are interacting with a substrate during processing of the substrate. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the two works. The claims are reviewed and the contributions by each inventor, as outlined above, are noted.

22. As per claim 1, this is concerned with an apparatus for simulating phenomena of a combined particle formed of individual particles (Misaka et al.: figs. 1, 2, 3b, 4), comprising:

a kinetic condition setting unit (this is inherent in particle simulators such as monte Carlo simulators) which sets information for defining a plurality of generation periods and a corresponding number of individual particles to be generated during each generation period (Misaka et al.: figs. 1, 2, 5 ("calculate fluxes"); col. 2, lines 29-34 and 49-59; Baumann et al.: pg. 4.4.1); and

a particle motion computing unit which generates the individual particles in accordance with the information set by the kinetic condition setting unit and computes motion of the generated individual particles, to simulate phenomena of the combined particle (again, this is inherent in particle simulators such as Monte Carlo simulators; Misaka et al.: abstract; fig. 1,2; col. 2 lines 49-59 and 59-64; col. 3, lines 3-68; col. 4, lines 1-6; Baumann et al.: pg. 4.4.1).

23. As per claim 2, this is concerned with an apparatus as in claim 1, wherein the combined particle is formed of substrate particles and adsorbate particles, each said individual particle being an adsorbate particle (Misaka et al.: abstract; figs. 1, 2, 3b, 4; col. 1, lines 35-68; col. 3, lines 16-68; col. 4, lines 50-65; Baumann et al.: fig. 1).

24. As per claim 3, this is concerned with an apparatus as in claim 1, wherein

the combined particle is formed of substrate particles and adsorbate particles, each said individual particle being an adsorbate particle (Misaka et al.: abstract; figs. 1, 2, 3b, 4; col. 1, lines 35-68; col. 3, lines 16-68; col. 4, lines 50-65; Baumann et al.: inherent in fig. 2), and,

before generating the individual particles, the particle motion computing unit generates the substrate particles (this would seem to be obvious; why generate particles which are to interact with a target if the target is not there; Misaka et al.: figs. 1, 2, 4, 5, 7, 8b, 9, 10; Baumann et al.: fig. 1).

25. As per claim 4, this is concerned with an apparatus as in claim 1, further comprising:

a display which allows a user to enter the information set by the kinetic condition setting unit (this is standard with respect to particle simulators in general. I have personally done this as it pertains to Monte Carlo simulations).

26. As per claim 5, this is concerned with an apparatus as in claim 1, wherein

the combined particle is formed of a first type of particle and a second type of particle, each of said individual particles being the first type of particle (Misaka et al.: abstract; figs. 1, 2,

3b, 4; col. 1, lines 35-68; col. 3, lines 16-68; col. 4, lines 50-65; Baumann et al.: fig. 1; pg. 4.4.1), and

the kinetic condition setting unit sets information for generating the second type of particle (obviously, this information must be provided for each species; Misaka et al.: figs. 1, 2, 5 ("calculate fluxes"); col. 2, lines 29-34 and 49-59; Baumann et al.: pg. 4.4.1)

27. As per claim 6, this is concerned with an apparatus as in claim 1, wherein

each individual particle is formed of smaller particles (Misaka et al.: fig. 1 ("radical"), fig. 2, fig. 4 (b,c,d); Baumann et al.: fig. 1; pg. 4.4.1);

the information set by the kinetic condition setting unit includes information indicating whether the smaller particles of a respective individual particle are fixed against center of mass of the individual particle (this limitation is not addressed due to the 112 issues raised); and

when the particle motion computing unit generates an individual particle and the information set by the kinetic condition setting unit indicates that the smaller particles of the respective individual particle are not fixed against center of mass, the particle motion computing unit provides a random orientation to the smaller particles of the individual particle (this is inherent in particle simulations in general, and in Monte Carlo simulations, in particular [see for example studies of ion attachment to electrodes submersed in salt solutions or studies of nucleation]).

28. As per claim 7, this is concerned with an apparatus as in claim 6, further comprising:

a display which allows a user to enter the information set by the kinetic condition setting unit (this is standard with respect to particle simulators in general. I have personally done this as it pertains to Monte Carlo simulations).

29. As per claim 8, this is concerned with an apparatus as in claim 1, wherein

each individual particle is formed of smaller particles (Misaka et al.: fig. 1 ("radical"), fig. 2, fig. 4 (b,c,d); Baumann et al.: fig. 1; pg. 4.4.1);

the information set by the kinetic condition setting unit includes information indicating whether the smaller particles of a respective individual particle are fixed against center of mass of the individual particle (this limitation is not addressed due to the 112 issues raised); and

when the particle motion computing unit generates an individual particle and the information set by the kinetic condition setting unit indicates that the smaller particles of the respective individual particle are not fixed against center of mass, the particle motion computing unit provides an initial velocity to the smaller particles of the individual (I assume the applicant is talking about molecules here? [in which case the parts of the molecule interact with each other via vibrational modes, and thus are not bound]) particle (this is inherent in particle simulations in general, and in Monte Carlo simulations, in particular [see for example studies of ion attachment to electrodes submersed in salt solutions or studies of nucleation]).

30. As per claim 9, this is concerned with an apparatus as in claim 1, wherein, when generating an individual particle, the particle motion computing unit provides a random direction of center of mass velocity of the individual particle (this is inherent in particle simulations in

general, and in Monte Carlo simulations, in particular [see for example studies of gaseous discharges wherein an electron is emitted from a cathode or an electron is ejected from an atom due to collisional ionization]).

31. As per claim 10, this is concerned with an apparatus as in claim 1, wherein

each individual particle has a corresponding emission source (Misaka et al.: fig. 1; Baumann et al.: inherent in fig. 1),

for each individual particle, the kinetic condition setting unit sets a region indicating a position of the corresponding emission source (Misaka et al.: fig. 1, # 15; also inherent in figs. 2, 7, 8b, 10; Baumann et al.: inherent in fig. 1), and

the particle motion computing unit generates each individual particle in accordance with the position of the corresponding emission source (Misaka et al.: fig. 1, # 15; Baumann et al.: inherent in fig. 1).

32. As per claim 11, this is concerned with an apparatus as in claim 1, further comprising:

a display which displays the information set by the kinetic condition setting unit (this is standard with respect to particle simulators in general. I have personally done this as it pertains to Monte Carlo simulations).

33. As per claim 12, this is concerned with an apparatus for simulating phenomena of a combined particle formed of individual particles, each individual particle having a corresponding emission source, the apparatus comprising:

an input device which allows a user to designate a region (this is standard with respect to particle simulators in general. I have seen done this as it pertains to Monte Carlo simulation [specifying the position of the cathode which is to eject electrons]; Misaka et al.: figs, 1, 5, 7, 8b, 9, 10; Baumann et al.: inherent in fig. 1);

a kinetic condition setting unit which, for each individual particle, sets the region designed by the user as a region indicating a position of the corresponding emission source (Misaka et al.: fig. 1, # 15; Baumann et al.: inherent in fig. 1); and

a particle motion computing unit which generates the individual particles in accordance with the position of the corresponding emission source as indicated by the region designated by the user and computes motion of the generated individual particles, to simulate phenomena of the combined particle (Misaka et al.: fig. 1, # 15; fig. 5 ; Baumann et al.: pg. 4.4.1).

34. As per claim 13, this is concerned with an apparatus as in claim 12, wherein the input device is a display (this is standard with respect to particle simulators in general. I have personally done this as it pertains to Monte Carlo simulations).

35. As per claim 14, this is concerned with an apparatus as in claim 12, further comprising:

a display which displays the information set by the kinetic condition setting unit (this is standard with respect to particle simulators in general. I have personally done this as it pertains to Monte Carlo simulations).

36. As per claim 15, this is concerned with an apparatus as in claim 14, wherein the display shows the individual particles generated by the particle motion computing unit and indicates the

motion computed by the particle motion computing unit (this is standard in the art; I have seen this type of display at conferences [in particular, the display showed particle dynamics in a hollow cathode discharge]).

37. As per claim 16, this is concerned with an apparatus for simulating phenomena of a combined particle formed of individual particles, comprising:

a kinetic condition setting unit (this is inherent in particle simulators such as monte Carlo simulators) which sets information for defining kinetic conditions of the individual particles (Misaka et al.: figs. 1, 2, 5 ("calculate fluxes"); col. 2, lines 29-34 and 49-59; Baumann et al.: pg. 4.4.1); and

a particle motion computing unit which generates the individual particles in accordance with the information set by the kinetic condition setting unit and computes motion of the generated individual particles, to simulate phenomena of the combined particle (again, this is inherent in particle simulators such as Monte Carlo simulators; Misaka et al.: abstract; fig. 1,2; col. 2 lines 49-59 and 59-64; col. 3, lines 3-68; col. 4, lines 1-6; Baumann et al.: pg. 4.4.1).

38. As per claim 17, this is concerned with an apparatus as in claim 16, wherein

the combined particle is formed a first type of particle and a second type of particle, the first type of particle moving towards the second type of particle, each of said individual particles being the first type of particle (Misaka et al.: fig. 1, 2, 3b; Baumann et al.: fig. 1),

the kinetic condition setting unit sets a region for defining an initial position of the individual particles (Misaka et al.: figs. 1, 5; Baumann et al.: inherent on pg. 4.4.1);

the apparatus further comprises a display which displays the relationship between the region set by the kinetic condition setting unit and a region indicating a position of a second type of particle forming the combined particle (this is standard in the art; I have seen this type of display at conferences [in particular, the display showed particle dynamics in a hollow cathode discharge]).

39. As per claim 18, this is concerned with an apparatus as in claim 17, wherein

the kinetic condition setting unit sets information for providing a direction of velocity to the individual particles (Misaka et al.: fig. 1, # 15; Baumann et al.: inherent on pg. 4.4.1), and

the display shows the direction of velocity with respect to the region set by the kinetic condition setting unit and the region indicating the position of the second type of particle (this is standard in the art; I have seen this type of display at conferences [in particular, the display showed particle dynamics in a hollow cathode discharge]).

40. As per claim 19, this is concerned with an apparatus as in claim 16, further comprising:

a display which displays the information set by the kinetic condition setting unit (this is standard with respect to particle simulators in general. I have personally done this as it pertains to Monte Carlo simulations).

41. As per claim 20, this is concerned with a method for simulating phenomena of a combined particle formed of individual particles, comprising the steps of:

setting information for defining a plurality of generation periods and a corresponding number of individual particles to be generated during each generation period (Misaka et al.: fig. 1, # 15; Baumann et al.: inherent on pg. 4.4.1);

generating the individual particles in accordance with the information set in the setting step (Misaka et al.: fig. 1, # 15; Baumann et al.: inherent on pg. 4.4.1); and

computing motion of the generated individual particles, to simulate phenomena of the combined particle (again, this is inherent in particle simulators such as Monte Carlo simulators; Misaka et al.: abstract; fig. 1, 2; col. 2 lines 49-59 and 59-64; col. 3, lines 3-68; col. 4, lines 1-6; Baumann et al.: pg. 4.4.1).

42. As per claim 21, this is concerned with a method as in claim 20, wherein the combined particle is formed of substrate particles and adsorbate particles, each said individual particle being an adsorbate particle (Misaka et al.: abstract; figs. 1, 2, 3b, 4; col. 1, lines 35-68; col. 3, lines 16-68; col. 4, lines 50-65; Baumann et al.: fig. 1, inherent in fig. 2).

43. As per claim 22, this is concerned with a method for simulating phenomena of a combined particle formed of individual particles, each individual particle having a corresponding emission source, the method comprising the steps of:

setting, for each individual particle, a region indicating a position of the corresponding emission source (this is standard with respect to particle simulators in general. I have seen done this as it pertains to Monte Carlo simulation [specifying the position of the cathode which is to eject electrons]; Misaka et al.: figs, 1, 5, 7, 8b, 9, 10; Baumann et al.: inherent on pg. 4.4.1);

generating the individual particles in accordance with the position of the corresponding emission source as indicated by the region set in the setting step (Misaka et al.: fig. 1, # 15; Baumann et al.: inherent on pg. 4.4.1); and

computing motion of the generated individual particles, to simulate phenomena of the combined particle (Misaka et al.: fig. 1, # 15; Baumann et al.: pg. 4.4.1).

44. As per claim 23, this is concerned with an apparatus for simulating phenomena of a combined particle formed of individual particles, comprising:

setting information for defining kinetic conditions of the individual particles;

displaying the set information (Misaka et al.: figs. 1, 2, 5 ("calculate fluxes"); col. 2, lines 29-34 and 49-59; Baumann et al.: inherent on pg. 4.4.1);

generating the individual particles in accordance with the set information (again, this is inherent in particle simulators such as Monte Carlo simulators; Misaka et al.: abstract; fig. 1,2; col. 2 lines 49-59 and 59-64; col. 3, lines 3-68; col. 4, lines 1-6; Baumann et al.: inherent on pg. 4.4.1); and

computing motion of the generated individual particles, to simulate phenomena of the combined particle (again, this is inherent in particle simulators such as Monte Carlo simulators; Misaka et al.: abstract; fig. 1,2; col. 2 lines 49-59 and 59-64; col. 3, lines 3-68; col. 4, lines 1-6; Baumann et al.: pg. 4.4.1).

45. As per claim 24, this is concerned with an apparatus for simulating phenomena of a combined particle formed of substrate particles and adsorbate particles, comprising:

a kinetic condition setting unit (this is inherent in particle simulators such as monte Carlo simulators) which sets information for defining kinetic conditions of the adsorbate particles (Misaka et al.: figs. 1, 2, 5 ("calculate fluxes"); col. 2, lines 29-34 and 49-59; Baumann et al.: inherent6 on pg. 4.4.1); and

a particle motion computing unit which generates the adsorbate particles in accordance with the information set by the kinetic condition setting unit and computes motion of the generated adsorbate particles, to simulate phenomena of the combined particle (again, this is inherent in particle simulators such as Monte Carlo simulators; Misaka et al.: abstract; fig. 1,2; col. 2 lines 49-59 and 59-64; col. 3, lines 3-68; col. 4, lines 1-6; Baumann et al.: pg. 4.4.1).

46. As per claim 25, this is concerned with an apparatus as in claim 24, wherein the information set by the kinetic condition setting unit (this is inherent in particle simulators such as monte Carlo simulators) defines a plurality of generation periods and a corresponding number of adsorbate particles to be generated during each generation period by the particle motion computing unit (Misaka et al.: figs. 1, 2, 5 ("calculate fluxes"); col. 2, lines 29-34 and 49-59; Baumann et al.: inherent on pg. 4.4.1).

47. As per claim 26, this is concerned with an apparatus as in claim 24, wherein

the information set by the kinetic condition setting unit includes information for defining kinetic conditions of the substrate particles (Misaka et al.: figs. 1, 2, 5 ("calculate fluxes"); col. 2, lines 29-34 and 49-59; Baumann et al.: inherent on pg. 4.4.1); and

the particle motion computing unit generates the substrate particles before generating the adsorbate particles (this would seem to be obvious; why generate particles which are to interact with a target if the target is not there; Misaka et al.: figs. 1, 2, 4, 5, 7, 8b, 9, 10; Baumann et al.: pg. 4.4.1).

48. As per claim 27, this is concerned with an apparatus as in claim 24, wherein

each substrate particle includes a fixed particle, a temperature control particle and a free particle (this limitation is not addressed due to the 112 issues raised; [however, Baumann et al. does address the issue of temperatue: fig. 6]),

the information set by the kinetic condition setting unit includes information for defining kinetic conditions of the fixed particle, the temperature control particle and the free particle of each substrate particle (Misaka et al.: figs. 1, 2, 5 ("calculate fluxes"); col. 2, lines 29-34 and 49-59; Baumann et al.: inherent on pg. 4.4.1), and

the particle motion computing unit generates the fixed particle, the temperature control particle and the free particle of each substrate particle in accordance with the information set by the kinetic condition setting unit (again, this is inherent in particle simulators such as Monte Carlo simulators; Misaka et al.: abstract; fig. 1,2; col. 2 lines 49-59 and 59-64; col. 3, lines 3-68; col. 4, lines 1-6; Baumann et al.: inherent on pg. 4.4.1).

49. As per claim 28, this is concerned with an apparatus as in claim 24, further comprising:

a display which displays the information set by the kinetic condition setting unit (this is standard with respect to particle simulators in general. I have personally done this as it pertains to Monte Carlo simulations).

50. As per claim 29, this is concerned with an apparatus as in claim 24, wherein

each adsorbate particle includes a plurality of smaller particles (Misaka et al.: fig. 1 ("radical"), fig. 2, fig. 4 (b,c,d); Baumann et al.: fig. 1);

the information set by the kinetic condition setting unit includes information indicating whether the smaller particles of a respective adsorbate particle are fixed against center of mass of the adsorbate particle (this limitation is not addressed due to the 112 issues raised); and

when the particle motion computing unit generates an adsorbate article and the information set by the kinetic condition setting unit indicates that the smaller particles of the respective adsorbate particle are not fixed against center of mass, the particle motion computing unit provides a random orientation to the smaller particles of the adsorbate particle (this is inherent in particle simulations in general, and in Monte Carlo simulations, in particular [see for example studies of ion attachment to electrodes submersed in salt solutions or studies of nucleation]).

51. As per claim 30, this is concerned with an apparatus as in claim 29, wherein,

when the particle motion computing unit generates an adsorbate particle and the information set by the kinetic condition setting unit indicates that the smaller particles of the respective adsorbate particle are not fixed against center of mass, the particle motion computing

unit provides an initial velocity to the smaller particles of the adsorbate particle (this is inherent in particle simulations in general, and in Monte Carlo simulations, in particular [see for example studies of ion attachment to electrodes submersed in salt solutions or studies of nucleation]).

52. As per claim 31, this is concerned with an apparatus as in claim 24, wherein, when generating an adsorbate particle, the particle motion computing unit provides a random direction of center of mass velocity of the adsorbate particle (this is inherent in particle simulations in general, and in Monte Carlo simulations, in particular [see for example studies of ion attachment to electrodes submersed in salt solutions or studies of nucleation]).

53. As per claim 32, this is concerned with an apparatus as in claim 24, wherein

each adsorbate particle has a corresponding emission source (Misaka et al.: fig. 1, # 15; also inherent in figs. 2, 7, 8b, 10; Baumann et al.: inherent on pg. 4.4.1),

for each adsorbate particle, the kinetic condition setting unit sets a region indicating a position of the corresponding emission source (Misaka et al.: fig. 1, # 15; also inherent in figs. 2, 7, 8b, 10; Baumann et al.: inherent on pg. 4.4.1), and

the particle motion computing unit generates each adsorbate particle in accordance with the position of the corresponding emission source as indicated by the region set by the kinetic condition setting unit (Misaka et al.: fig. 1, # 15; Baumann et al.: pg. 4.4.1).

Conclusion

54. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

(1) Ohta (U. S. Patent 5,751,607, *Method of Sputter Deposition Simulation by Inverse Trajectory Calculation*, 1998) discloses the use of Monte Carlo techniques as it pertains to the simulation of sputtering.

(2) Jones et al., "Monte Carlo Investigation of Electron-Impact Ionization in Liquid Xenon," *Phys. Rev. B.*, **48**, 9382-9387, 1993 teaches the use of Monte Carlo techniques as it pertains to electron transport in condensed media; references are provided to more details desciptions of Monte Carlo techniques.

(3) Takagi, "Development of New Materials by Ionized-Cluster Beam Technique," Mat. Res. Soc. Symp. Proc., **27**, 501-511, 1984 discloses ion beam clusters ("combined particles") and its relation to deposition.

55. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Hugh Jones whose telephone number is (703) 305-0023.

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